

CLAIMS

- 1 1. A magnetic head, comprising:
 - 2 a substrate;
 - 3 a read head being fabricated upon said substrate;
 - 4 a P1 pole being fabricated upon said read head;
 - 5 an insulation layer being fabricated upon said P1 pole;
 - 6 a P2 pole tip seed layer being fabricated upon portions of said insulation layer;
 - 7 a dielectric layer being fabricated upon said P2 pole tip seed layer and upon said
 - 8 insulation layer;
 - 9 a P2 pole tip being fabricated upon said P2 pole tip seed layer and within said dielectric
 - 10 material layer;
 - 11 a back gap piece being fabricated within said dielectric material layer and in magnetic
 - 12 interconnection with said P1 pole;
 - 13 an induction coil seed layer being fabricated in part upon said insulation layer and in part
 - 14 upon portions of said dielectric material layer;
 - 15 an induction coil being fabricated upon said induction coil seed layer and within said
 - 16 dielectric material layer;
 - 17 a second insulation layer being fabricated upon said induction coil;
 - 18 a P2 pole yoke being fabricated upon said second insulation layer in magnetic
 - 19 interconnection with said P2 pole tip and with said back gap piece;
 - 20 an encapsulation layer being fabricated above said P2 pole yoke.

1 2. A magnetic head as described in claim 1 wherein said dielectric material layer includes a
2 P2 pole tip trench, an induction coil trench and a back gap piece trench.

1 3. A magnetic head as described in claim 2 wherein said P1 pole tip trench, said induction
2 coil trench and said back gap piece trench are formed in a single reactive ion etch fabrication
3 step.

1 4. A magnetic head as described in claim 3 wherein a P1 pole notch is formed in said P1
2 pole proximate said P2 pole tip.

1 5. A magnetic head as described in claim 4 wherein a P1 pole notching trench is fabricated
2 in said dielectric material layer in a second reactive ion etch fabrication step.

1 6. A hard disk drive comprising:
2 at least one hard disk being fabricated for rotary motion upon a disk drive;
3 at least one magnetic head adapted to fly over said hard disk for writing data on said hard
4 disk, said magnetic head including:
5 a substrate;
6 a read head being fabricated upon said substrate;
7 a P1 pole being fabricated upon said read head;
8 an insulation layer being fabricated upon said P1 pole;
9 a P2 pole tip seed layer being fabricated upon portions of said insulation layer;

10 a dielectric layer being fabricated upon said P2 pole tip seed layer and upon said
11 insulation layer;
12 a P2 pole tip being fabricated upon said P2 pole tip seed layer and within said dielectric
13 material layer;
14 a back gap piece being fabricated within said dielectric material layer and in magnetic
15 interconnection with said P1 pole;
16 an induction coil seed layer being fabricated in part upon said insulation layer and in part
17 upon portions of said dielectric material layer;
18 an induction coil being fabricated upon said induction coil seed layer and within said
19 dielectric material layer;
20 a second insulation layer being fabricated upon said induction coil;
21 a P2 pole yoke being fabricated upon said second insulation layer in magnetic
22 interconnection with said P2 pole tip and with said back gap piece;
23 an encapsulation layer being fabricated above said P2 pole yoke.

1 7. A hard disk drive as described in claim 6 wherein said dielectric material layer includes a
2 P2 pole tip trench, an induction coil trench and a back gap piece trench.

1 8. A hard disk drive as described in claim 7 wherein said P1 pole tip trench, said induction
2 coil trench and said back gap trench are formed in a single reactive ion etch fabrication step.

1 9. A hard disk drive as described in claim 8 wherein a P1 pole notch is formed in said P1
2 pole proximate said P2 pole tip.

1 10. A method for fabricating a magnetic head comprising the steps of:
2 fabricating a read head upon a substrate;
3 fabricating a P1 pole upon said read head;
4 fabricating an insulation layer upon said P1 pole;
5 fabricating an RIE etchable dielectric material layer upon said insulation layer;
6 fabricating trenches within said dielectric material layer, including a P2 pole tip trench,
7 an induction coil trench and a back gap piece trench;
8 simultaneously fabricating a P2 pole tip within said P2 pole tip trench and a back gap
9 piece within said back gap piece trench, such that said back gap piece is magnetically
10 interconnected with said P1 pole;
11 fabricating an induction coil within said induction coil trench;
12 fabricating a second insulation layer upon said induction coil;
13 fabricating a P2 pole yoke above said second insulation layer in magnetic interconnection
14 with said P2 pole tip and said back gap piece;
15 fabricating an encapsulation layer above said P2 pole yoke.

1 11. A method for fabricating a magnetic head as described in claim 10, further including the
2 steps of fabricating a patterned P2 pole tip seed layer upon said insulation layer prior to
3 fabricating said dielectric material layer.

1 12. A method for fabricating a magnetic head as described in claim 11 wherein said P2 pole
2 tip seed layer is not deposited in a location of said induction coil trench.

1 13. A method for fabricating a magnetic head as described in claim 10 including the further
2 step of depositing an induction coil seed layer within said induction coil trench, subsequent to
3 fabricating said P2 pole tip and back gap piece.

1 14. A method for fabricating a magnetic head as described in claim 10, wherein said step of
2 fabricating trenches within said dielectric material layer is performed in a reactive ion etch
3 process.

1 15. A method for fabricating a magnetic head as described in claim 14 wherein said dielectric
2 material layer is comprised of SiO_2 and said reactive ion etch process is conducted utilizing
3 fluorine ion species.

1 16. A method for fabricating a magnetic head as described in claim 14 wherein said dielectric
2 material layer is comprised of an organic polymer material and said RIE etching process is
3 conducted utilizing an oxygen ion species.

1 17. A method for fabricating a magnetic head as described in claim 10 wherein a P1 pole
2 notching process is conducted following the fabrication of said P2 pole yoke.

1 18. A method for fabricating a magnetic head as described in claim 17 wherein said P1 pole
2 notching step includes the steps of RIE etching said dielectric material proximate said P2 pole
3 tip, and ion beam etching said P2 pole tip seed layer, said insulation layer and portions of said P1
4 pole.

- 1 19. A method for fabricating a magnetic head as described in claim 13 wherein said P2 pole
- 2 tip seed layer is comprised of NiFe, and said induction coil seed layer is composed of copper.